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FM AMEMBASSY PRETORIA  
TO RUEHC/SECSTATE WASHDC 5574  
INFO RUCPDC/DEPT OF COMMERCE WASHDC  
RHEBAAA/DEPT OF ENERGY WASHINGTON DC  
RUEHC/DEPT OF LABOR WASHDC  
RUEHBJ/AMEMBASSY BEIJING 0836  
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SUBJECT: Platinum Group Metals - Rising Star at Risk

REF: A) 07 Johannesburg 0214  
B) Pretoria 585  
C) Pretoria 565

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Summary  
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11. (SBU) Platinum has been the star performer in the South African mining industry for a number of years. South Africa is the world's number one producer of the platinum group metals (PGMs): platinum, rhodium, ruthenium and iridium, while Russia supplies the bulk of the world's palladium. The country hosts more than 85 percent of the world's PGM reserves, and South Africa's PGM revenues exceeded the combined income from coal and gold in 2007. PGMs accounted for 35 percent of total mineral revenues, 41 percent of mineral exports, and 12.3 percent of the country's merchandised exports. Output of newly mined PGMs declined marginally (except for rhodium) in 2007-2008 due to labor disputes, power outages, temporary closure of shafts for safety reasons, and smelter problems. The industry has thus not been able to fully capitalize on the prevailing record prices of early 2008. Prospects for PGMs looked good for 2008 and beyond, but this has changed since the end of June as falling prices and escalating costs threaten to reduce cash flows and squeeze profit margins in the months ahead. Some project delays have been announced, but so far most mine and plant expansions and new mine developments are proceeding. Recent price falls and cost escalation are causes for particular concern to junior miners, many of which are developing lower grade deposits and are dependent on a sustained high rhodium price. Industry consolidation is highly likely, possibly at lower prices, reminiscent of consolidation in the South African gold industry eighty years ago. End Summary.

12. (SBU) Minerals/Energy Officer and Specialist visited senior officials in a number of platinum mining companies, toured Impala Platinum's underground mine in Rustenburg and Xstrata's new Elandsfontein open pit mine outside Pretoria, and attended a number of mining conferences including South Africa's premier mining convention, the Mining Indaba 2008 in February, as preparation for this comprehensive PGM cable. The organizations visited include the Chamber of Mines and the Council for Science and Industry Research (CSIR) - Miningtek and Embassy officers also met with Senior Executives of Anglo Platinum, Impala Platinum, Aquarius Platinum and Mintek (the government mineral processing research arm).

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The Bushveld Complex - the World's Great Treasure House  
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13. (SBU) The Bushveld Complex is the world's most valuable orebody. All its minerals have industrial, oil refinery, chemical and electronic uses (and jewelry for platinum and palladium) and demand for them is likely to continue to grow, absent a significant global economic slowdown or substitution by other commodities. The Bushveld Complex is an east-west trending, oval-shaped, layered igneous intrusion that covers an area of more than 65,000 square kilometers. It has known under-explored extensions off the main body to the north, south and west. The complex contains the world's greatest accumulation of PGMs (platinum, palladium, rhodium, ruthenium, iridium and osmium), chromium, vanadium, titanium, iron ore in the form of magnetite, fluorspar, alumino-silicates such as andalusite, and feldspar. It also hosts smaller but valuable concentrations of copper, nickel, gold, tin, cobalt, selenium, tellurium and other minerals.

14. (SBU) The Bushveld's numerous chromite layers are generally continuous throughout the complex. They host PGMs in varying concentrations and relative proportions, but only the Merensky and UG2 (Upper Group 2 chromite seam) reefs in the main body and the Plat reef in the northern extension have been economic to mine to date. Ores from the western Bushveld generally contain a higher proportion of platinum. The eastern and northern limbs are generally of lower grade, have a lower platinum/palladium ratio, and have a higher content of palladium, rhodium and base metals. The PGM orebodies outcrop on surface and extend to depths greater than 2,200 meters. Compared to the Merensky reef, the UG2 is generally

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of lower grade, but has higher percentages of palladium, rhodium and base metals.

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South Africa's Platinum Boom  
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15. (SBU) South Africa supplied 77 percent of the world's platinum, 85 percent of the rhodium, 32 percent of the palladium, and nearly all of the ruthenium and iridium in 2007. Its export earnings from PGMs were nearly \$1 billion more than the combined revenues for gold and coal in 2007. PGMs in South Africa accounted for:

- 35 percent of the value of mineral production;
- 41 percent of mineral exports;
- more than 12 percent of merchandised exports; and
- nearly 3 percent of GDP.

The economy was further boosted by the manufacture and export of 16.2 million auto-catalytic converter units (15 percent of global production), valued at more than \$3 billion, and local beneficiation of PGMs to refined metal worth \$1.3 billion. Output of newly mined PGMs declined marginally (except for rhodium) in 2007-2008 due to labor disputes, power outages, temporary closure of shafts for safety reasons, and smelter problems. The industry was, thus, not able to fully capitalize on the record prices prevailing during the period. Prospects for 2008 and beyond looked rosy for PGMs until the July fall in platinum and rhodium prices. Most announced mine expansion and development projects are proceeding, but a few longer-term projects are being delayed, supposedly because of power concerns.

16. (SBU) Major beneficiaries of the PGM industry growth have been the wealth created for the local Bafokeng Nation of 300,000 people and employment on PGM mines, which continues to increase. The Bafokeng have exchanged their royalties for 13.4 percent equity in Impala Platinum mine, which makes them Impala's single biggest shareholder. They also share ownership in the Bafokeng Rasimone 50/50 JV (platinum mine) with Anglo Platinum. Estimates show Bafokeng assets to be \$4 to \$5 billion and annual dividends of the order of \$200,000 to \$300,000. The PGM industry employs 170,000-180,000 people, each of whom support (statistically) some ten family and extended family members, most of whom live in poor rural communities in and outside the country.

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PGMs Eclipse Gold  
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¶7. (SBU) During the 10-year period from 1998 to 2007, PGM production increased by some 52 percent compared to gold, which declined by 46 percent (Ref C). Over the past 7-years employment in PGM mines increased by 60 percent, accounting for about 38 percent of the total mining industry workforce, whereas employment on gold mines declined by 25 percent and now accounts for 32 percent of the workforce. The value of PGM production over the past 10-years increased by 560 percent in rand terms and 460 percent in US dollar terms compared to gold, which increased by 56 percent and 26 percent, respectively.

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Production and Producers  
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¶8. (SBU) PGM mining generally takes place from surface to some 1,600 meters, but the Northam platinum mine is already probing depths of 2,200 meters. Mines will have to go deeper as the shallow ore is depleted and will require costly cooling ventilation (at 1,300 meter depth the ambient rock temperature is about 43 degrees Celsius). The Merensky and UG2 reefs are thin and working stopes are seldom higher than 1 to 1.2 meters (similar to gold reefs). Conventional opencast and underground narrow reef and mechanized bulk mining methods are in use. Underground mining is generally labor-intensive but low-profile mechanized units are being introduced to increase productivity. The Plat reef measures up to 100 meters thick in places, and lends itself to bulk open-pit mechanized mining methods.

South African PGM production in 2007 comprised:

-- Anglo Platinum 48 percent;

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-- Impala Platinum 22 percent;

-- Lonhro Platinum 17 percent;

-- the rest (including ARM, Aquarius and Northam) 13 percent.

¶9. (SBU) Conventional processing methods are used for PGM mineral extraction, concentration and smelting. Refining is a more costly and complex process only affordable by the big companies that produce more than 1-million ounces of platinum per year. South Africa has six PGM smelters and four refineries, each of different design, and a total annual refinery capacity of 6-million ounces of platinum. These facilities process their own mine concentrates as well as those bought from other producers. They also offer a toll-smelting and refining service to small producers. State-owned research organization Mintek and Australian company Braemore are jointly developing a low-cost smelter that will allow great flexibility in ore types, will tolerate high chromite ores, and will not limit the quantities of base metals or sulfur contained in the concentrates. This will enable junior mining companies to afford their own smelters. The final refined PGM products are 99.95 percent pure metal ingots, granular powders, and sponge. These are very valuable so security around the plants is tight and PGM products are transported by air under heavy guard.

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PGM Price Volatility  
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¶10. (SBU) The commodity boom took off in about 2002 and PGM prices climbed steadily. During the 6-months to the end of June 2008, platinum, palladium, and rhodium prices were volatile and increased by 29, 20, and 39 percent, respectively. The average price fell in July by 16 percent and August has seen further declines and high volatility. These extreme price movements are variously blamed on the current economic slowdown, speculators, and mismanagement and offloading of excess PGM stocks by automakers. High prices for platinum and rhodium have resulted in:

-- metal thrifting (less metal for the same purpose);

-- substitution (up to 25 percent) of platinum by cheaper palladium in catalytic converters for diesel engines;

- reworking of PGM tailings dumps;
- increased recycling of PGM scrap; and
- increasing use of palladium in jewelry.

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Missing the PGM Boom  
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¶11. (SBU) South Africa has to some extent missed out on the PGM boom (Ref A) because of the normal time-lag between new demand and gearing up to deliver new supply, which can take many years. This has been exacerbated by:

- uncertainty in the implementation of the SAG's new minerals and labor policies and legislation;
- lack of experience and capacity within the Department of Minerals and Energy (DME);
- skills shortage, much of it through emigration; and
- production cut-backs due to power outages and rationing, labor strikes, and forced mine closures following fatal accidents.

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Grappling with the Power Crunch  
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¶12. (SBU) Most mines and plants in South Africa were shut down between January 25 and 31 when state power utility Eskom announced a force majeure on power supply to mines. Estimated production losses by the PGM mines exceeded \$40 million per day and the National Energy Regulator (NERSA) also estimates that load-shedding cost the country \$7 billion. Heavy power users agreed at the time to a 10 percent power reduction to prevent total system failure. This was later decreased to 5 percent on a case by case basis to minimize potential job losses in deep mines and mines with large labor complements. Most mines have shown that they can maintain near-capacity output by employing energy-efficient practices, and that over time they will be able to resume full production at

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reduced power levels.

¶13. (SBU) There are more than 30 new and expansion PGM projects underway, mostly in the eastern and northern sections of the Bushveld Complex. So far, few significant project delays or cancellations have been acknowledged by either major or junior companies. One notable exception is Impala's announcement that plans to produce 2.5 million ounces of platinum by 2012 have been delayed to 2015. It is not clear whether this is the result of the energy situation or the economic down-turn. The big-three PGM producers, Anglo, Impala and Lonrho, are going ahead with mining and plant expansions and juniors with mine development. Eskom has warned that its power safety margin is razor-thin at less than 5 percent, and that this could further decline and possibly become negative in 2011, if consumer savings of 5-10 percent are not achieved. It would be five to six years before new capacity can provide a satisfactory margin of 10 to 15 percent. Eskom's ability to provide nearly uninterrupted power during the recent local winter months is attributed to:

- industry power savings of 5 to 10 percent;
  - production cut-backs and delayed expansions by aluminum and ferro-alloy smelters;
  - new megawatts (2,000 to 3,000) from rehabilitated coal-fired units and new (very costly) diesel generators following fatal accidents (for up to a week in some instances).
- Continuation of this practice is likely to cause further production losses as the inspectorate is understaffed, has little experience in accident investigation, and must rely on and be taught by industry. Industry representatives argue that mine closures increase the risk of accidents when work resumes, due to rapid deterioration of roof conditions and equipment integrity when unattended. President Mbeki ordered that safety audits be conducted on all mines during 2008. The report has been completed, but is not yet been made available.
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Long-Term Increase in PGM Production  
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¶16. (SBU) South Africa, Russia and Zimbabwe together host more than 90 percent of the world's known reserves and resources of platinum, palladium and rhodium. These metals are essential catalysts for neutralizing nitrate and sulfate emissions from motor exhausts and are also essential inputs to the electronics, chemical, oil, and glass industries. Continuing global pressure for a cleaner environment ensures that demand for PGMs will increase with time, unless cleaner engines and fuels, metal thrifting, or cheaper substitute metals and technologies are developed. Recycling of PGM scrap is likely to increase in the future, which will contribute to satisfying global demand, but could also pose a threat to new production. Platinum is the dominant PGM metal mined in South

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Africa and all other metals are produced as by-products and dependent on platinum production. At current prices rhodium contributes significantly to company gross revenues, while representing less than 10 percent of the PGM mix.

¶17. (SBU) Future PGM production growth in South Africa depends on the implementation of expansion plans by Anglo, Impala and Lonrho, and on new production from the many active junior miners. These estimates include:

- 2-million PGM ounces (1.2-million platinum ounces) from the big-three producers;
- 460,000 PGM ounces from three mines scheduled for production during 2008;
- 1.9 million PGM ounces from six projects scheduled for production in the next 3-5 years; and
- unknown output from some 16 projects, at various stages of evaluation, with a production horizon beyond 5-years.

Environmental challenges to PGM mining and expansions have to date been sporadic and limited because of the thoroughness of pre-mining studies. Social challenges mainly relate to the movement of communities off land to be mined, but in most cases companies have proved they have adequately compensated the communities.

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International PGM Production  
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¶18. (SBU) South African and Zimbabwean PGM deposits are unique in that they are mined primarily for platinum. The Stillwater Complex in Montana (U.S.), has geological similarities with the Bushveld Complex, but palladium is the dominant metal. Other PGM production outside Africa is a by-product of copper-nickel mining and contains a high proportion of palladium and minor platinum, rhodium. Most of this production comes from the Russian Norilsk deposits in the Ural Mountains, and Canada's Sudbury Basin in Ontario. Small Russian platinum alluvial deposits are the exception, but are said to be depleted pending further discoveries. Africa's other major platinum deposit is Zimbabwe's Great Dyke (Ref B). It is a layer igneous intrusion, similar to the Bushveld Complex, and is approximately 550 kilometers long and averages 3 kilometers in width and 500 meters in depth. Total PGM production is less than 600,000 ounces per year. Impala Platinum has a major stake in the Dyke and says potential production is as much as 4 million ounces of platinum per year, but this is unlikely to be realized until political stability is restored to that country.

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Rising Costs and Declining Prospects for PGMs  
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¶19. (SBU) PGM producers face secular increase in costs and a potential "bubble burst" in PGM prices, particularly platinum and rhodium. A recent analysis by Royal Bank of Canada Capital Markets (RBCCM) investment analysts found that at the current PGM blended "basket price" of about \$1,300 per ounce and total costs of \$1,000 to \$1,200 per ounce, at least one-third of South Africa's PGM



production now generates negative cashflows. Additionally, according to these analysts the sector could see further cashflow declines of between 30 and 50 percent in the near-term. They identified the two main culprits as runaway input costs and longer term power shortages. Capital costs have more than doubled in the last two years and operating costs are increasing annually by 20 to 25 percent. Input from Impala Platinum's Marketing Executive generally confirmed the RBCCM findings. However, he also pointed out that PGM mines generate some 10 to 20 percent of revenues from by-products such as nickel, copper, gold and cobalt, and these are credits against PGM costs. He also said that major negative influences are declining car sales in the OECD, which he expects will be slow to turn around, and substantial declines in production efficiency. Impala attributes the latter to high labor turnover, labor strikes, loss of skills to emigration, and mine closures by the Department of Minerals and Energy for safety inspections following fatal accidents.

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Comment  
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¶20. (SBU) PGM resources of the South African Bushveld are huge by any measure, but if existing prices (fallen off by about 25 to 35 percent from early 2008 highs) and escalating costs prevail for any length of time, a number of projects are likely to be merged, taken over, curtailed or abandoned. Some new projects are relatively low-grade and depend on the recent high prices of rhodium and platinum for economic viability. Some are being developed by junior companies, which lack sufficient resources to see them through an extended economic downturn. Issues of safety, health, skills and black economic empowerment will need to be addressed as these have the potential to negatively affect the strategic value of PGMs as an employer of unskilled and skilled labor, a generator of foreign exchange, and an initiator of technology and research innovation. Water should not be a problem, however, because of the number of dams being built in the eastern Bushveld, where much of the new PGM development is taking place.

¶21. (SBU) Appendix (sourced primarily from Johnson Matthey Platinum 2008)

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Tables of PGM Supply, Demand and Prices  
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Platinum Supply (thousands of ounces)

	2002	2003	2004	2005	2006	2007
S Africa	4,450	4,630	5,010	5,115	5,295	5,035
Russian	980	1,050	845	890	920	910
N America	390	295	385	365	345	325
Zimbabwe	150	225	250	270	270	280
Total	5,970	6,200	6,490	6,640	6,830	6,550

Platinum Demand (thousands of ounces)

Autocats	2,590	3,270	3,490	3,795	3,905	4,225
Recycled	(565)	(645)	(690)	(770)	(860)	(890)
Jewelry	2,820	2,510	2,160	1,965	1,640	1,585
Rest	1,625	1,395	1,580	1,705	1,790	2,110
Total	6,470	6,530	6,540	6,695	6,475	7,030
Surplus	(500)	(330)	(50)	(55)	355	(480)
Ave.Price\$/oz	540	691	846	897	1,143	1,304

Palladium Supply (thousands of ounces)

S Africa	2,160	2,320	2,480	2,605	2,775	2,770
Russia	1,930	2,950	4,800	4,620	3,920	4,540
N America	990	935	1,035	910	985	990
Zimbabwe	170	245	265	270	270	285
Total	5,250	6,450	8,580	8,405	7,950	8,585

# Palladium Demand (thousands of ounces)

Autocats	3,050	3,450	3,790	3,865	4,015	4,450
Recycled	(370)	(410)	(530)	(625)	(805)	(1,000)
Dental	785	825	850	815	620	635
Electronics	760	900	920	970	1,205	1,285
Jewelry	270	260	930	1,430	995	740
Rest	345	405	600	900	575	725
Total	4,840	5,430	6,560	7,355	6,605	6,835

Surplus	410	1,020	2,020	1,050	1,345	1,750
Ave.Price\$/oz	337	201	230	201	320	355

# Rhodium Supply (thousands of ounces)

S Africa	490	544	587	627	666	696
Russia	90	140	100	90	100	90
N America	25	26	17	20	17	17
QN America	25	26	17	20	17	17
Zimbabwe	10	14	16	17	19	19
Total	615	724	720	754	802	822

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# Rhodium Demand (thousands of ounces)

Autocats	599	660	758	829	863	879
Recycled	(99)	(124)	(140)	(137)	(171)	(183)
Chemical	39	39	43	48	49	64
Glass	37	26	46	57	65	64
Rest	16	19	22	30	32	32
Total	592	620	729	827	838	856

Surplus	23	104	(9)	(73)	(36)	(34)
Ave.Price\$/oz	838	530	986	2,056	4,552	6,191

# Average Percentage Price Movements in 2008

	January-June	July-August	January-August
Platinum	+29%	-26%	-5%
Palladium	+20%	-28%	-14%
Rhodium	+39%	-34%	-9%
Ruthenium	-25%	flat	-26%
Iridium	flat	flat	flat

# Percentage Price Movements in July and August 2008

	July	August
Platinum	-15%	-13%
Palladium	-18%	-20%
Rhodium	-15%	-43%

# Estimated Average Profit Margins for Major Producers

2002	2003	2004	2005	2006	2007	Mid-2008		
Margins		50%	35%	30%	30%	42%	44%	47%

La Lime